United States Naval Academy
Mechanical Engineering Department

Catalog Description: EM486H Waste-to-Energy Conversion **Credit:** 3 (3-0-3)
Designation: Elective engineering course

This course covers way to recover useful energy from things typically viewed as "waste" and the science and technology associated with current waste-to-energy systems.

Prerequisites: 1/C Engineering major for approval of department chair

Corequisites: None

Textbooks: None

Course Director: Professor Patrick Caton

Course Content:

No.	Topic or Subtopic	hrs.
1	Energy and exergy in the Earth system	3
2	Forms of waste	4
3	Characterization and metrics of waste	6
4	Proximate, ultimate, energy content analysis	4
5	Analysis of waste combustion	4
6	Technology of waste combustion	4
7	Waste heat recovery	4
8	Biological conversion	4
9	Analysis of waste gasification	4
10	Technology of waste gasification	4
11	Emissions control	5

Assessment Methods:

		YES	NO
A	Quizzes	X	
B	Homework	X	
C	Exams	X	
D	Laboratory Reports		X
E	Oral Presentations	X	
F	Design Reports/Notebooks		X
G	Prototypes/Demonstrations		X
H	Projects	X	
I	Other		X

Course Outcomes[1]

1. Understand and express the overall energy usage picture of the US and the world and the extent to which various waste resources fit into that picture. (A, B, C, E, H)
2. Use proximate, ultimate, and energy content analyses to characterize waste resources, and use these data to develop stoichiometry and energy balances. (B, E, H)
3. Describe the current technology used for combustion, gasification, and biodigestion waste-to-energy energy conversion. (A, B, C, E, H)
4. Understand the potential and challenges of waste heat recovery. (A, C)
5. Identify modern technology used for waste heat recovery systems. (A, C)
6. Appreciate how waste-to-energy systems could have important relevance for military platforms and missions. (E, H)

[1] Letters in parenthesis refer to the assessment methods listed in the previous section.

	Course Outcomes					
Program Outcomes	(1)	(2)	(3)	(4)	(5)	(6)
(a)	X	X	X	X	X	X
(b)	X					X
(c)						X
(d)						
(e)	X	X				
(f)						
(g)	X					X
(h)						X
(i)						X
(j)	X		X		X	X
(k)	X	X				

Date of Latest Revision: 8 NOV 2017, Professor Patrick Caton